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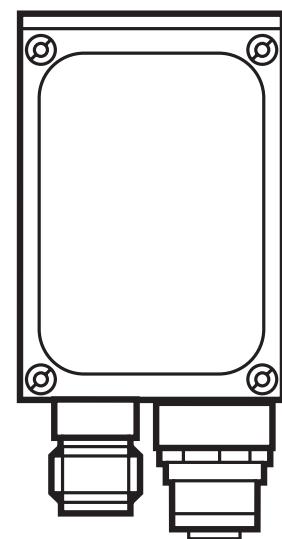
CE

Operating instructions  
Object recognition sensor

**efector 250<sup>®</sup>**

UK

**O2D22x**



10 / 2009

704435 / 02

## Contents

1 Preliminary note . . . . .	4
1.1 Symbols used . . . . .	4
2 Safety instructions . . . . .	4
3 Items supplied . . . . .	4
3.1 Accessories . . . . .	4
4 Functions and features . . . . .	4
5 Installation . . . . .	5
5.1 Mounting accessories . . . . .	5
5.2 Mounting dimensions . . . . .	6
5.3 Installation location . . . . .	6
6 Electrical connection . . . . .	6
6.1 Wiring . . . . .	7
6.2 Wiring diagram . . . . .	7
6.3 External illumination . . . . .	8
6.4 External trigger source . . . . .	8
6.4.1 Timing diagram inputs/outputs . . . . .	8
7 Operating and display elements . . . . .	11
7.1 LED display . . . . .	11
7.2 Display . . . . .	12
7.2.1 Operation indication . . . . .	12
7.2.2 Connection via operating program . . . . .	13
7.2.3 Error messages . . . . .	13
7.3 Pushbuttons . . . . .	13
8 Set-up . . . . .	13
8.1 Parameter setting on the device . . . . .	14
8.2 Verify and set the IP address on the unit . . . . .	14
8.3 Adjustable parameters . . . . .	15
8.3.1 Parameter structure . . . . .	16
8.4 Lock / unlock the sensor . . . . .	17
8.4.1 Reset device to factory settings . . . . .	17
8.5 Parameter setting via PC operating program . . . . .	17
9. Operation . . . . .	17
9.1 Evaluation mode (normal operating mode) . . . . .	17
10 Scale drawing . . . . .	18
11 Technical data . . . . .	19
11.1 Operating distance L . . . . .	19
11.2 Factory settings . . . . .	19
12 Process data protocol . . . . .	20
12.1 Establishing TCP/IP connection . . . . .	20
12.2 Basic communication . . . . .	20

12.3 Protocol version .....	21
12.4 Type of commands .....	21
12.5 Requesting the trigger pulse.....	21
12.6 Select the protocol version .....	22
12.7 Select the application .....	22
12.8 Activate/deactivate the result output.....	22
12.9 Transmit the image to the device for evaluation.....	23
12.10 Transmit the application data set to the device .....	23
12.11 Request the assignment of the application data from the device .....	23
12.12 Request the statistics from the device .....	24
12.13 Request the error code from the device .....	24
12.14 Request the last image from the device .....	24
12.15 Request the last result from the device .....	25
12.16 Release trigger, evaluate the image and result output via process interface if output is active .....	25
12.17 Request the protocol version .....	25
12.18 Request the device information .....	26
12.19 Request the last "bad" image from the device .....	26
12.20 Result message .....	27
12.21 Error codes from the device .....	28
13 Maintenance, repair and disposal .....	30
14 Approvals / standards .....	30
15 Note regarding the software .....	30

## 1 Preliminary note

### 1.1 Symbols used

- Instruction
- > Reaction, result
- [...] Designation of pushbuttons, buttons or indications
-  Reference to the kind and source of a hazard
- Instruction to avoid a hazard
- Target, reference

## 2 Safety instructions

These instructions are part of the device. They contain texts and drawings concerning the correct handling of the device and must be read before installation or use.

Observe the operating instructions.

Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or handling can affect the safety of people and machinery.

The installation and connection must comply with the applicable national and international standards.

Responsibility lies with the person installing the unit.

Only the signals indicated in the technical data or on the device label may be supplied to the connections or wires.

## 3 Items supplied

- object recognition sensor O2D22x
- operating instructions "object recognition sensor O2D22x", ident no.: 704435

The device is supplied without installation/connection accessories and software.

### 3.1 Accessories

[www.ifm.com](http://www.ifm.com) → Data sheet direct → e.g. O2D220 → Accessories

## 4 Functions and features

The sensor uses incident light or backlight to detect the contours of an object and compares them with the contours of one or several models in a reference image.

Depending on the degree of conformity the output can indicate if a model was found or which one was found.

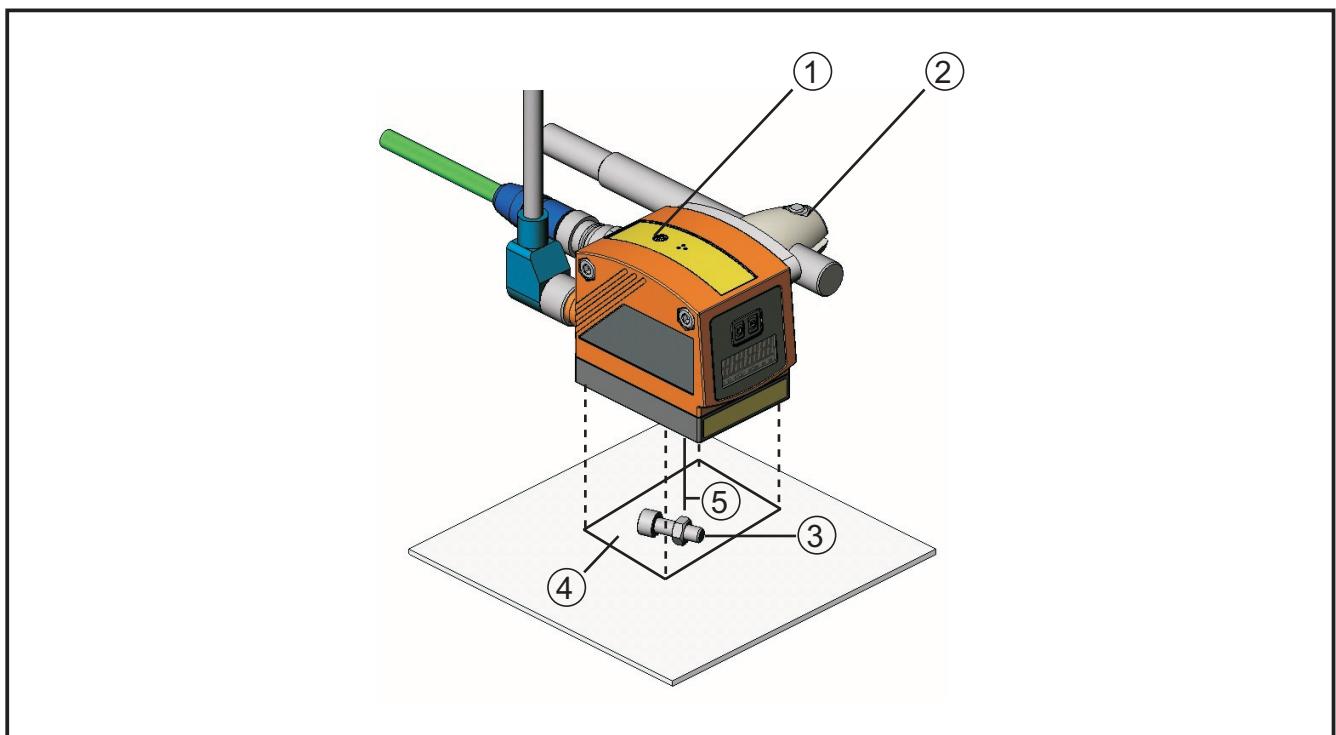
## 5 Installation

### 5.1 Mounting accessories

The device is compatible with the mounting accessories of ifm's photoelectric sensors for the O2Ixxx (multicode reader), O2Mxxx (EthernetCamera) series etc.

Example mounting with clamp and bracket

- Use the mounting accessory E2D101.



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1. focal setter
2. mounting accessory
3. object to be recognised
4. field of view size W X H
5. operating distance L

Depending on the intended location and type of mounting the following mounting accessories are available:

Description	Art. no.
Mounting set for shaft Ø 12 mm (clamp and bracket for types O2Dxxx, O2Mxxx, O2Ixxx)	E2D110
Shaft, straight Ø 12 mm, length 130 mm, M10	E20938
Shaft, angled Ø 12 mm, length 200 mm, M10	E20940
Mounting set for shaft Ø 14 mm (clamp and bracket for types O2Dxxx, O2Mxxx, O2Ixxx)	E2D112

Description	Art. no.
Shaft, straight Ø 14 mm, length 130 mm, M12	E20939
Shaft, angled Ø 14 mm, length 200 mm, M12	E20941

You can find more information about the available accessories at

[www.ifm.com](http://www.ifm.com) → Data sheet direct → e.g. O2D220 → Accessories  
or directly

[www.ifm.com](http://www.ifm.com) → Data sheet direct → z.B. E2D110

## 5.2 Mounting dimensions

The device is mounted using the mounting accessories or 2 M4 screws and nuts.  
Hole dimensions → chapter 10 Scale drawing.

## 5.3 Installation location

- ▶ Mount the sensor in front of or above the area to be monitored. The detectable field of view size depends on the operating distance → chapter 11.1 Technical Data.
- ▶ Back light or scattered light situations and continuously changing light conditions are to be avoided.
- ▶ Do not position room lights directly facing the camera lens.
- ▶ Position the optional external illumination (e.g. O2D909) opposite the camera lens.
- ▶ To avoid adverse effects on the image detection, avoid installation in heavily polluting areas of the machine.
- ▶ The connected cables must be provided with a strain relief.

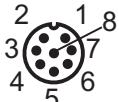
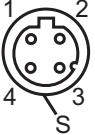
## 6 Electrical connection

### NOTE

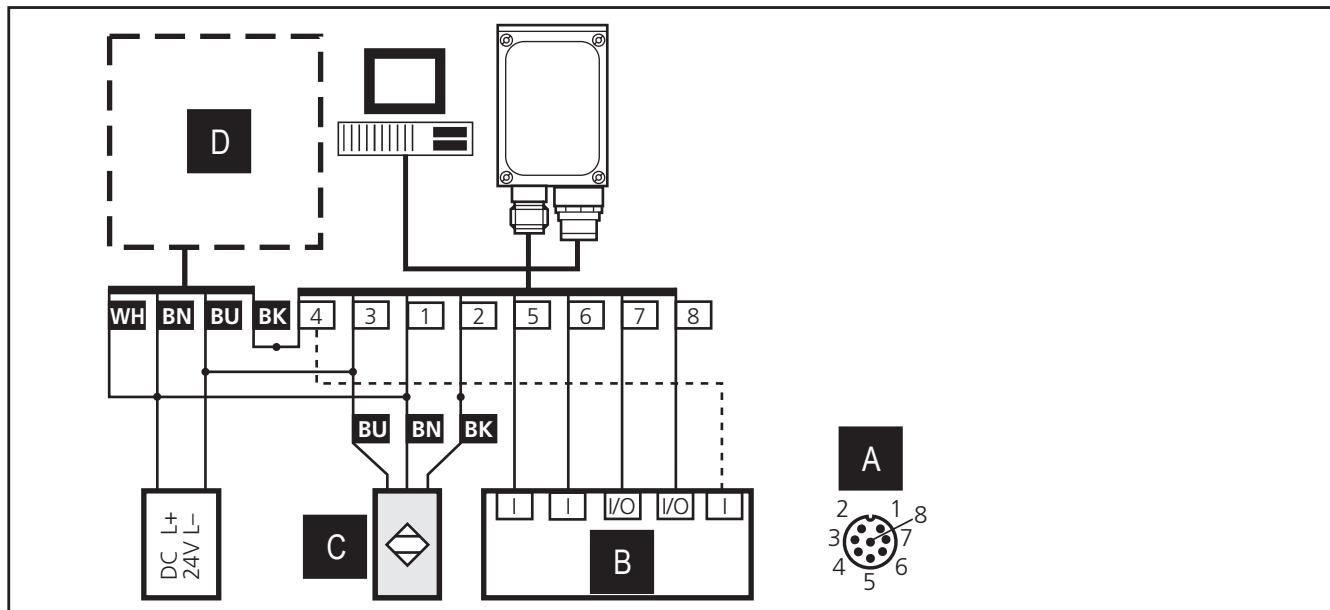
The unit must be connected by a qualified electrician. Disconnect power before connecting the unit.

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## 6.1 Wiring

Process interface (1)	
M12 connector, A-coded, 8 poles	
 1 2 3 4 5 6 7 8	1 U+ 2 trigger input 3 0V 4 switching output / trigger output 5 switching output (ready) 6 switching output (OUT) 7 switching output / input 1 8 switching output / input 2
Parameter/process interface (2)	
M12 socket, D-coded, 4 poles	
 1 2 3 4 S	1 Ethernet TD + 2 Ethernet RD + 3 Ethernet TD - 4 Ethernet RD - S Shield

## 6.2 Wiring diagram



A	process interface (M12 connector, A-coded, 8 poles)
B	controller e.g. PLC
C	external trigger
D	external lighting (optional)

Pin	Use (factory setting)
5	Output signal "READY" provides the status of the sensor: "1" after the evaluation has been carried out. "0" as long as the evaluation is being carried out, a different application is being selected or in case of an internal error (trigger signals are ignored).
6	Output signal "OUT" provides the result of the evaluation: "0" no matching model "1" matching model

## 6.3 External illumination

- ▶ Connect external illumination to the trigger output of the device.

Example	Art. no.
Illumination unit, transmitter red light 630 nm	O2D909

For information about the a.-m. example see:

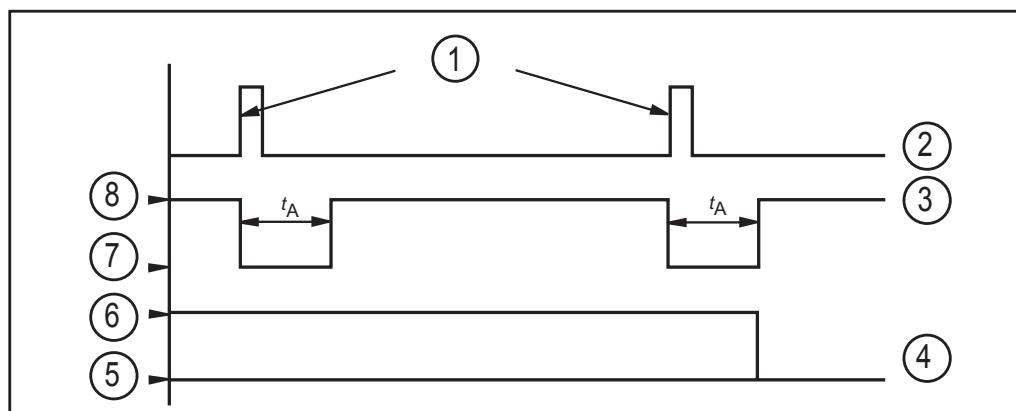
[www.ifm.com](http://www.ifm.com) → Data sheet direct → O2D909

## 6.4 External trigger source

- ▶ Connect an external trigger source (e.g. a diffuse reflection sensor) to the trigger input of the device.

 If you use an external trigger source (e.g. a diffuse reflection sensor), connect the trigger signal to the trigger input of the sensor. If you use external illumination, it must be controlled via the trigger output of the sensor. Depending on the device setting, one of four configuration files saved in the sensor can be selected via two switching inputs. Information about the test result is provided via switching outputs.

### 6.4.1 Timing diagram inputs/outputs



1: triggering on positive edge 2: trigger input 3: output READY

4: output OUT 5: error 6: ok 7: OUT invalid 8: OUT valid

The evaluation time  $t_A$  depends on

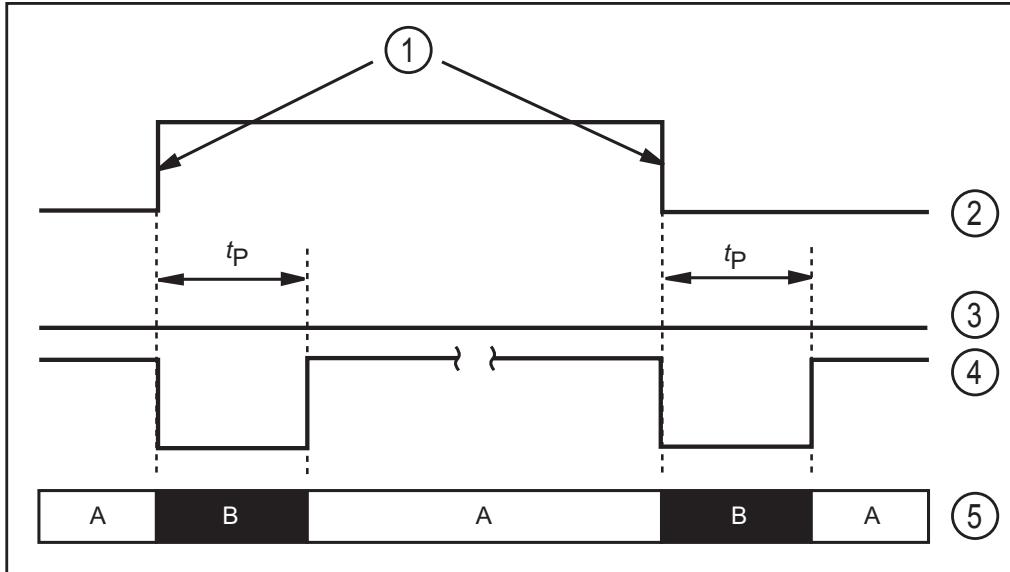
- the size of the field of view selected
- the model size
- the smoothing degree
- the sensitivity
- the orientation
- the number of models

Typical evaluation times are between 50 and 800 ms.

With the corresponding unit configuration the first four applications can be selected via the switching inputs.

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Input		Application no.
2	1	
0	0	1
0	1	2
1	0	3
1	1	4



1: selection of the application

2: switching input 1

3: switching input 2

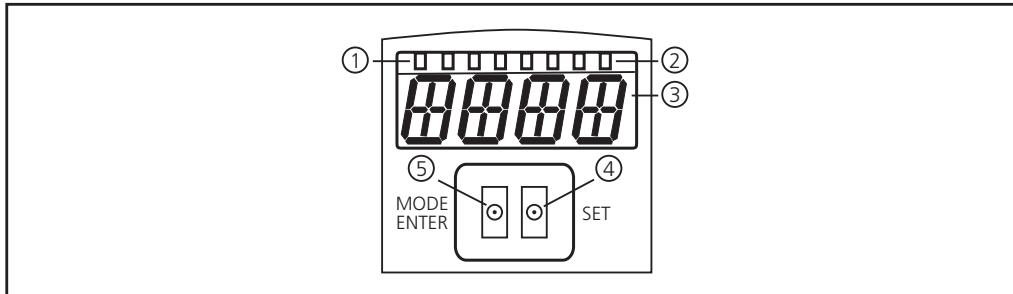
4: output READY

5: trigger input

A	trigger enabled
B	trigger disabled

Depending on the application the trigger disable time  $t_P$  is 3...10 s.

## 7 Operating and display elements



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1	3 x LED green	Lighting LED Power (readiness for operation) Eth (Ethernet connection status) Con (status of the connection to the operating program (software))
2	4 x LED yellow	Indication of the switching status; lights when the corresponding input or output is switched.  LED 1 status indication switching output 1 / switching input 1  LED 2 status indication switching output 2 / switching input 2  LED 3 status indication switching output 3  LED 4 status indication switching output 4
3	4-digit alphanumeric display	Indication of the evaluation results, parameters, parameter values, warnings and error messages
4	Programming button Set	Setting of the parameter values (continuously by keeping the button pressed; incrementally by pressing the button once).
5	Programming button Mode / Enter	Selection of the parameters and acknowledgement of the parameter values.

### 7.1 LED display

- LED green Power: ready for operation display
  - lights: ready for operation
  - flashes (20 Hz): device fault
  - flashes (2 Hz): no application on the device
- LED green Eth: Ethernet connection status
  - lights: connection available
  - flashes: data traffic
- LED green Con: connection status to operating program
  - lights: connection available
- LED yellow 1: switching status indication
  - out: switching input 1 / switching output 1 not switched

- on: switching input 1 / switching output 1 switched
- flashes (20 Hz): short circuit switching output 1
- LED yellow 2: switching status indication
  - out: switching input 2 / switching output 2 not switched
  - on: switching input 2 / switching output 2 switched
  - flashes (20 Hz): short circuit switching output 2
- LED yellow 3: switching status indication
  - out: switching output 3 not switched
  - on: switching output 3 switched
  - flashes (20 Hz): short circuit switching output 3
- LED yellow 4: switching status indication
  - out: switching output 4 not switched
  - on: switching output 4 switched
  - flashes (20 Hz): short circuit switching output 4

## 7.2 Display

### 7.2.1 Operation indication

Display	Description
vnnn	Version number of the IO controller software (1st indication after power on), e. g. v041).
Init	Device initialisation after power-on (2nd indication after power on).
nnnn	Firmware version, e.g. 1031 (3rd indication after power on).
rEdY	Device ready for trigger (4th indication after power-on if one configuration is active with external triggering. Device waiting for triggering).
WAIT	Unit is busy.
nr28	Application successful (number of the application).
run	Device waiting for connection, no application active (factory setting)
LOAd	Loading an application
donE	Loading of application completed
uLoc	Pushbuttons unlocked parameter values can be displayed and changed
Lock	Locking the pushbuttons
Lok1	Pushbuttons locked
FWUP	Firmware update running

## 7.2.2 Connection via operating program

Display	Description
OnLI	Connection with the operating program
Parm	Parameter setting via operating program
Moni	Monitor mode
SerP	Connection with the operating program, service report mode

## 7.2.3 Error messages

Display	Description
FAIL	Application not successful
ErrD	Critical hardware error
ErrP	Selection of a non-existing application via switching inputs
SC	Short circuit of a switching output
DHCP nolP	No DHCP server found. Both character strings are displayed alternately.

## 7.3 Pushbuttons

Button	Function
MODE/ENTER	Change to the parameter setting mode Selecting the parameters Confirming the parameter values
SET	Selecting the subparameters  Setting/changing/selecting the parameter values - incremental by pressing briefly - scrolling by holding pressed

## 8 Set-up

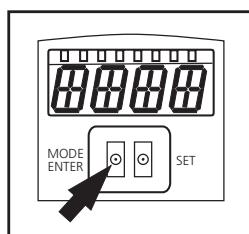
Set-up is carried out via a menu-guided PC operating program. The device stores up to 32 applications.

## 8.1 Parameter setting on the device

Set the parameter values via pushbuttons and display on the device.

The sensor is programmed using the two buttons [Mode/Enter] and [Set].

First activate a parameter with the [Mode/Enter] button, select the requested value with the [Set] button and confirm it pressing again the [Mode/Enter] button.



The device goes to the parameter setting mode when

- ▶ [MODE/ENTER] is pressed for longer than 1 s.
- > The first menu item is displayed.
- ▶ Press [MODE/ENTER] so often until the requested parameter is displayed.
- ▶ Press [SET].
- ▶ The menu item is activated and the current setting is displayed.
- ▶ Keep [SET] pressed.
- > The display flashes, after 5 s with pressed SET button the display stops flashing.
- ▶ Press [SET] and change setting.
- ▶ Press [MODE/ENTER]..
- > The change is acknowledged and the previous menu item is shown again.

If no button is pressed longer than 15 s, you will get to the next higher menu item or the evaluation mode.



The device does not operate during use of the pushbuttons.

## 8.2 Verify and set the IP address on the unit

- ▶ Select the parameter "IP" (IP address) with [MODE/ENTER] and [SET].
- > The IP address is processed automatically and shown in 4 groups (A, b, C, d).
- ▶ Verify the IP address and set with [SET], if necessary.



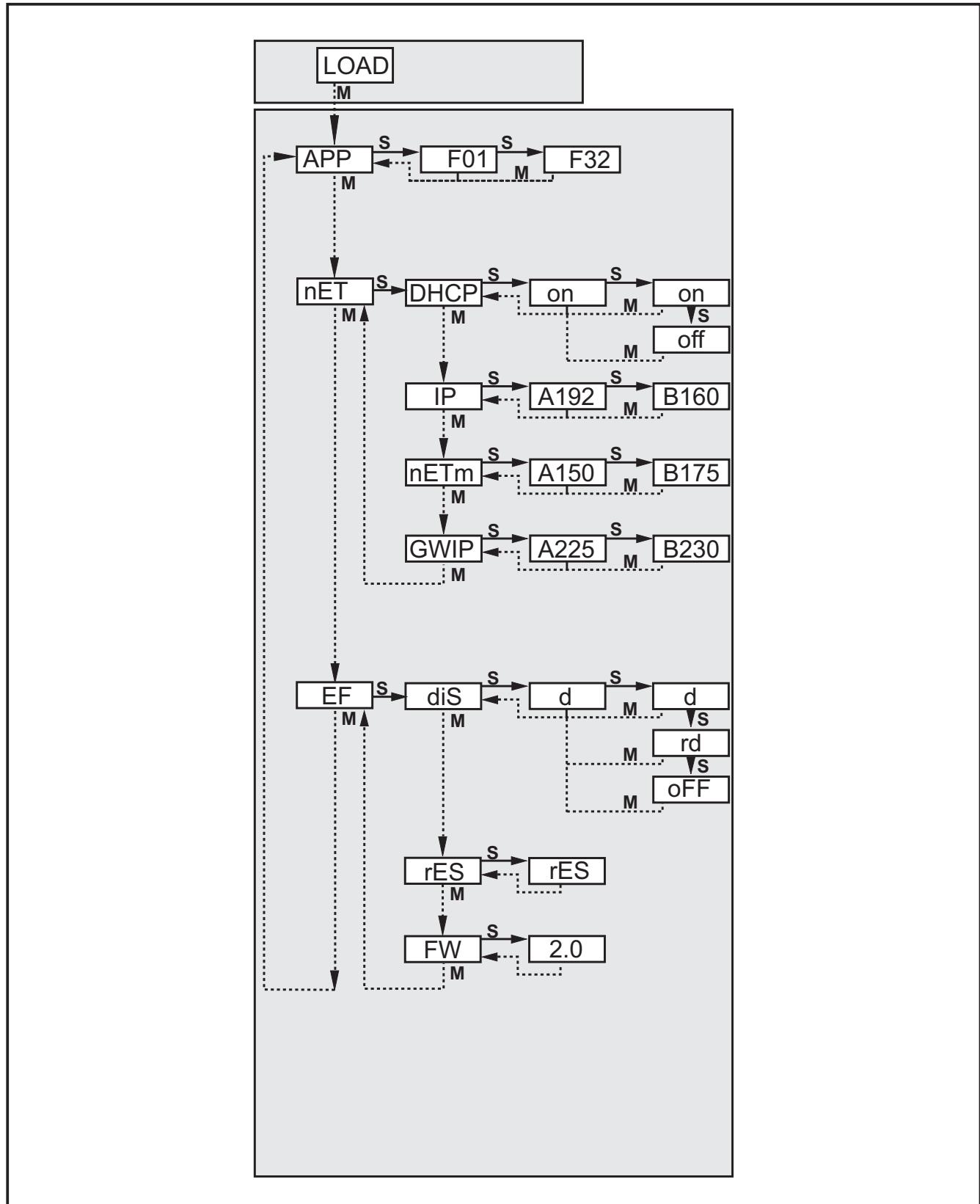
Changes only become effective after a restart of the unit (power off, power on).

## 8.3 Adjustable parameters

<b>APP</b>	<p><b>Memory location</b></p> <p>Select an application. The device can save up to 32 applications. By pressing the SET button the memory location number is incremented in the display. The current state of the memory location is visualised in the first digit of the display:</p> <p>F = memory location available.</p> <p>I = memory location used by an inactive application.</p> <p>A = memory location used by an active application.</p> <p>E = memory location (selected by external selection of the application).</p>
<b>NET</b>	<p><b>Network operation</b></p> <p>Here you set the parameters for network operation.</p>
<b>DHCP</b>	<p><b>Network settings via DHCP</b></p> <p>If the sensor is to get its network settings via DHCP, select the setting "on" in this menu item. With the setting "off" the fixed network settings (see next menu items) are used. In the DHCP mode the sensor must be operated in a network with DHCP server. Otherwise it is not accessible via the operating program E2D200.</p>
<b>IP</b>	<p><b>Set IP address</b></p> <p>Here the IP address of the sensor is set. This setting is used when the sensor does not work in the DHCP mode. The input is made in the "dotted decimal" notation, e.g. 192.168.0.3. Using the SET button you can select the four groups of the address. The respective group is visualised by a letter in the first digit of the display.</p>
<b>NETm</b>	<p><b>Set subnet mask</b></p> <p>Here the subnet mask of the sensor is set. This setting is used when the sensor does not work in the DHCP mode.</p> <p>The subnet mask must match the IP address. It is input in the same way as the IP address.</p>
<b>GWIP</b>	<p><b>Set gateway address</b></p> <p>Here the gateway address used by the sensor is set. This setting is used when the sensor does not work in the DHCP mode. It is input in the same way as the IP address.</p>
<b>EF</b>	<p><b>Access extended functions</b></p> <p>Here the extended functions of the sensor are accessed.</p>
<b>di S</b>	<p><b>Rotate / switch off display</b></p> <p>Here you set whether a text is displayed normally (d) or rotated by 180° (rd). You also set whether the display is to be switched off (oFF) in the evaluation mode.</p>
<b>r-ES</b>	<p><b>Reset sensor</b></p> <p>Here you reset the sensor to the factory setting.</p>
<b>FW</b>	<p><b>Firmware version</b></p> <p>In this menu item you can enquire about the firmware version of the sensor.</p>

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### 8.3.1 Parameter structure



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## 8.4 Lock / unlock the sensor

### Lock sensor

- ▶ Keep [Mode/Enter] and [Set] pressed simultaneously for 10 s.
- > Display changes to uLok.
- ▶ Press [Set].
- ▶ Display changes to Lock.
- ▶ Confirm with [Mode/Enter].
- > The sensor is locked.

### Unlock the sensor

- ▶ Keep [Mode/Enter] and [Set] pressed simultaneously for 10 s.
- > Display shows Lok1, changes to Lock after 10 s.
- ▶ Press [Set].
- > Display changes to uLok.
- ▶ Confirm with [Mode/Enter].

The sensor is unlocked, display changes to run.

### 8.4.1 Reset device to factory settings

- ▶ Activate the parameter "rES".
- ▶ Press [SET] > 5 s.

## 8.5 Parameter setting via PC operating program

The PC operating program is described in a separate document → programming manual E2D200.

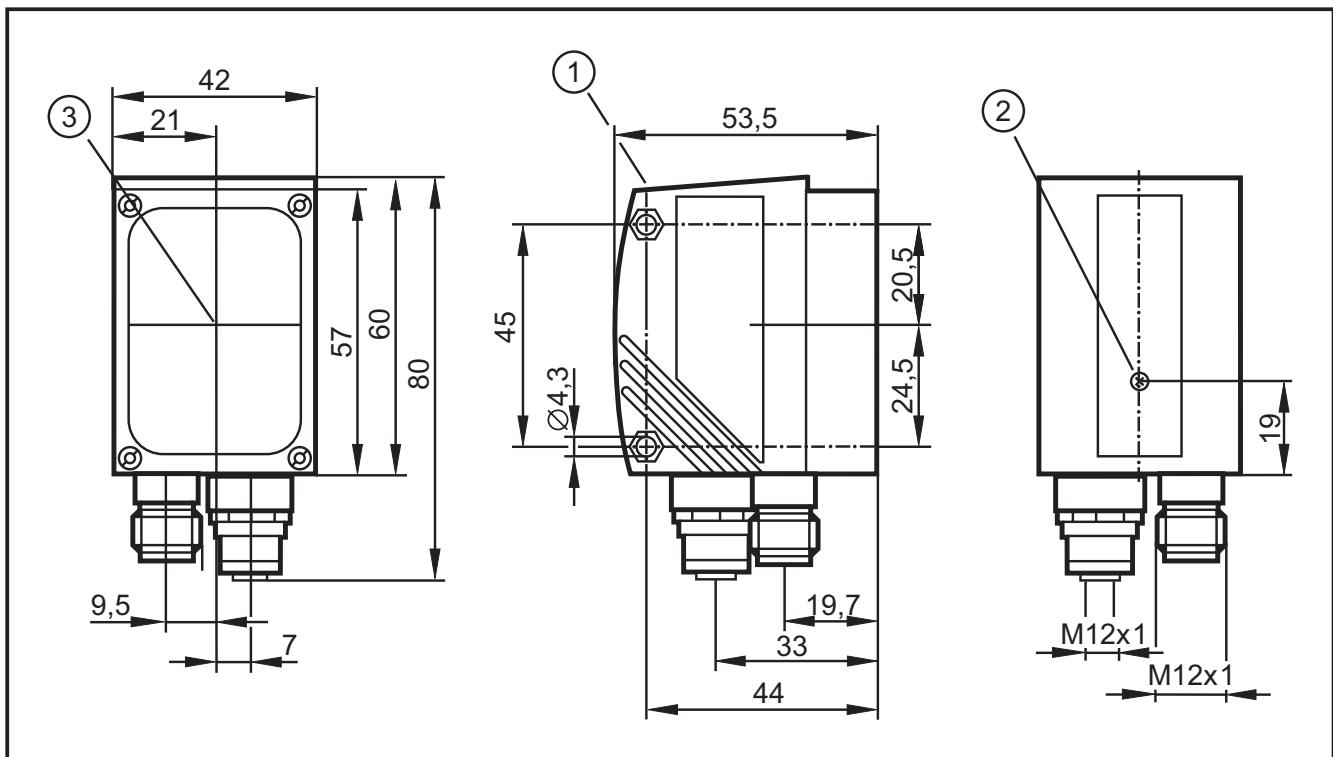
[www.ifm.com](http://www.ifm.com) → Data sheet direct → E2D200 → Additional data

# 9. Operation

## 9.1 Evaluation mode (normal operating mode)

After power-on the device is in the evaluation mode. If an active application is saved on the device, it carries out its monitoring function and generates output signals according to the set parameters. The display indicates the current evaluation result, the yellow LEDs signal the switching status of the outputs or inputs.

## 10 Scale drawing



1. Operating and display elements
2. Focal setter
3. Middle of the optical axis

## 11 Technical data

### 11.1 Operating distance L

When selecting the operating distance it has to be taken into account that contour detection becomes less reliable with decreasing size of the objects. The objects to be detected should cover at least 5% of the field of view. For the operating distance L depending on the applications please see the following table.

<b>Type O2D224 / O2D225</b>				
Operating distance L [mm]	50	75	100	200
Field of view size WxH [mm]	–	15x11	20x14	40x30
Resolution [mm]	–	0.08	0.12	0.25
Operating distance L [mm]	400	1000	2000	
Field of view size WxH [mm]	80x60	200x150	400x300	
Resolution [mm]	0.52	1.25	2.52	

<b>Type O2D222 / O2D229</b>				
Operating distance L [mm]	50	75	100	200
Field of view size WxH [mm]	32x46	44x61	56x77	140x100
Resolution [mm]	0.3	0.4	0.5	0.9
Operating distance L [mm]	400	1000	2000	
Field of view size WxH [mm]	270x200	640x480	1280x960	
Resolution [mm]	1.7	4.0	8.0	

<b>Type O2D220 / O2D227</b>				
Operating distance L [mm]	50	75	100	200
Field of view size WxH [mm]	14x20	20x28	26x36	68x50
Resolution [mm]	0,1	0,2	0,3	0,4
Operating distance L [mm]	400	1000	2000	
Field of view size WxH [mm]	130x100	320x240	640x480	
Resolution [mm]	0.8	2.0	4.0	

### 11.2 Factory settings

#### Device settings

Device name	New sensor
Device location	New location
DHCP	Not active
IP address	192.168.0.49
Subnet mask	255.255.255.0
Gateway	192.168.0.0.201
XML-RPC port	8080
Video port	50002
Application selection via switching inputs	Not active
Trigger debouncing	Not active

## Application settings

Models	None
Minimum match	80%
Contour tolerance width	4
Number of models	1
Orientation	-10°... +10° (operating program)
Device connection 4	Trigger output (with external illumination)
Device connection 5	Switching output, function evaluation completed (ready)
Device connection 6	Switching output, function all models detected
Device connection 7	Switching output 1
Device connection 8	Switching output 2
Illumination	Internal
Trigger mode	Continuous

## 12 Process data protocol

The process interface ensures communication between the process PC (e.g. PLC) and the device. A command from the process PC can for example activate trigger pulses, select applications or provide application results.

### 12.1 Establishing TCP/IP connection

Selection of TCP/IP is carried out in the PC operating program under "Process interface TCP/IP" → programming manual E2D200 → chapter 9.1.2.

### 12.2 Basic communication

- 8-bit ASCII characters are allowed.
- All transmissions to the device are terminated with a carriage return and a linefeed character (CR + LF = ASCII 13 dec + 10 dec).
- All transmissions from the device are terminated with a carriage return and a linefeed character (CR + LF = ASCII 13 dec + 10 dec).
- As a reply to a valid command the device provides the character string  
\* CR LF (ASCII 42 dec + 13 dec + 10 dec).
- As a reply to an invalid command the device provides the character string  
\* CR LF (ASCII 63 dec + 13 dec + 10 dec).
- If the device cannot carry out a message, the device provides the character string CR LF (ASCII 33 dec + 13 dec + 10 dec).

## 12.3 Protocol version

The device supports 3 different protocol versions with different message format.

Version	Format
V1	<contents>CR LF
V2	<ticket><contents>CR LF
V3	<ticket><length>CR LF <ticket><contents>CR LF

<contents> is the command to the device or the reply by the device (e.g. evaluation results).

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<ticket> is a character string of 4 digits 0-9, to be interpreted as decimal number. If a message with a specific ticket is sent to the device, its reply will contain the same ticket. Ticket 0000 is reserved for messages sent by the device independently.

<length> is a character string beginning with the letter 'L' followed by 9 digits to be interpreted as decimal number. This figure indicates the length of the following data (<ticket><contents>CR LF) in bytes.

Factory setting and reset condition are V2.

## 12.4 Type of commands

There are two different types of commands to the device: actions and requests.

Actions have the device do something, e.g. take an image and evaluate it.

Requests are used to retrieve information from the device.

The replies by the device are either status information, reply messages or results.

Results are transmitted by the device without a request being sent to the device before.

The device transmits status information and reply messages as direct reply to action commands or request commands.

## 12.5 Requesting the trigger pulse

Command	t	
Description	Release the trigger and evaluate the image. No result output via process interface.	
Type	Action	
Reply	*	The trigger was released.
	!	<ul style="list-style-type: none"> <li>• Device busy with evaluation.</li> <li>• The device is in an invalid state, e.g. administer applications.</li> <li>• Another trigger source has been selected for the device.</li> </ul>

## 12.6 Select the protocol version

<b>Command</b>	v <digit><digit>	
<b>Type</b>	Action	
<b>Reply</b>	*	Normal case
	!	The device does not support the protocol version indicated.
<b>Note</b>	<digit><digit>: to be interpreted as two-digit decimal number for the protocol version. The protocol version is not changed before the reply by the device.	

## 12.7 Select the application

<b>Command</b>	c <group><number>	
<b>Type</b>	Action	
<b>Reply</b>	*	Successful change
	!	<ul style="list-style-type: none"> <li>• The device is in an invalid state, e.g. administer applications.</li> <li>• Invalid or not existing group or application number.</li> </ul>
<b>Note</b>	<group>: digit for the application group (always 0 for O2D22X). <number>: two-digit character string, to be interpreted as decimal number for the application number.	

## 12.8 Activate/deactivate the result output

<b>Command</b>	p <digit>	
<b>Type</b>	Action	
<b>Reply</b>	*	Successful execution
	!	<ul style="list-style-type: none"> <li>• No active application.</li> <li>• &lt;digit&gt; contains incorrect value.</li> <li>• The device is in an invalid state.</li> </ul>
<b>Note</b>	<digit> is either 0 or 1. 1 enables the result output. 0 disables the result output. See message T?.	

## 12.9 Transmit the image to the device for evaluation

<b>Command</b>	i <length><image data>	
<b>Type</b>	Action	
<b>Reply</b>	*	Normal case
	?	Invalid length
	!	<ul style="list-style-type: none"> <li>• No application at present.</li> <li>• Application is being edited.</li> <li>• The image format (BMP, RAW, etc.) does not meet the specifications.</li> <li>• Invalid image contents (image size, internal image head data).</li> </ul>
<b>Note</b>	<p>&lt;length&gt;: character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in byte.</p> <p>Image data format according to setting in the operating program. The image must be available with a resolution of 640x480. With the Raw image format, each pixel is coded with an 8 bit value, the bmp must be available in 8 bit format.</p>	

## 12.10 Transmit the application data set to the device

<b>Command</b>	u <length><group><number><application data set>	
<b>Type</b>	Action	
<b>Reply</b>	*	Normal case
	?	Invalid length
	!	<ul style="list-style-type: none"> <li>• The device is in teach mode or in administrative mode.</li> <li>• &lt;application data set&gt; is no valid application.</li> <li>• The group/application number is invalid.</li> <li>• "Selection of the application" via digital switching inputs is activated.</li> </ul>
<b>Note</b>	<p>&lt;length&gt;: Character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in byte. (file length + 3 for group and number).</p> <p>&lt;group&gt;: digit for the application group (always 0 for O2D22X).</p> <p>&lt;number&gt;: two-digit character string, to be interpreted as decimal number for the application number.</p>	

## 12.11 Request the assignment of the application data from the device

<b>Command</b>	a?	
<b>Type</b>	Request	
<b>Reply</b>	<number><blank><group><number><blank><group> <number><blank>...<group><number>	Normal case
	!	No application active on the device.

Note	<p>&lt;number&gt;: character string with 3 digits for the number of applications on the device as decimal number.</p> <p>&lt;group&gt;: digit for the application group (always 0 for O2D22X).</p> <p>&lt;number&gt;: two-digit character string, to be interpreted as decimal number for the application number.</p> <p>At first the number of the active configuration is output.</p> <p>&lt;blank&gt;: individual blank.</p>
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## 12.12 Request the statistics from the device

Command	s?	
Type	Request	
Reply	<total><blank><good><blank><bad>	Normal case
	!	No application active on the device.
Note	<p>&lt;total&gt;: total number of evaluations.</p> <p>&lt;good&gt;: number of "good" evaluations.</p> <p>&lt;bad&gt;: number of "bad" evaluations.</p> <p>&lt;blank&gt;: individual blank.</p> <p>&lt;total&gt;, &lt;good&gt; and &lt;bad&gt; are always character strings with 10 digits, to be interpreted as decimal number.</p>	

## 12.13 Request the error code from the device

Kommando	E?	
Type	Request	
Reply	<code>	
Note	<p>&lt;code&gt; is the error code, character string with 4 digits, to be interpreted as decimal number.</p> <p>→ chapter Error codes 12.21</p>	

## 12.14 Request the last image from the device

Command	I?	
Type	Request	
Reply	<length><image data>	Normal case
	!	<ul style="list-style-type: none"> <li>• No application at present.</li> <li>• No evaluation carried out.</li> <li>• Sensor is working.</li> </ul>
Note	<p>&lt;length&gt;: Character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in byte.</p> <p>Image data format according to setting in the operating program.</p>	

## 12.15 Request the last result from the device

<b>Command</b>	R?	
<b>Type</b>	Request	
<b>Reply</b>	Message in result format → chapter Result message 12.20	Normal case
	!	<ul style="list-style-type: none"> <li>• No application at present.</li> <li>• Application is being edited.</li> <li>• No results available yet.</li> </ul>
<b>Note</b>	none	

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## 12.16 Release trigger, evaluate the image and result output via process interface if output is active

<b>Command</b>	T?	
<b>Type</b>	Request	
<b>Reply</b>	Message in result format → chapter Result message 12.20.	Normal case
	!	<ul style="list-style-type: none"> <li>• No application at present.</li> <li>• Application is being edited.</li> <li>• Current trigger mode set not via TCP/IP.</li> </ul>
<b>Note</b>	Activate the output → Enable/disable result output (p1).	

## 12.17 Request the protocol version

<b>Command</b>	V?	
<b>Type</b>	Request	
<b>Reply</b>	<current><blank><min><blank><max> <current> two-digit decimal number with current version <blank> blank <min> two-digit decimal number with minimum version <max> two-digit decimal number with maximum version	
<b>Note</b>	none	

## 12.18 Request the device information

<b>Command</b>	D?
<b>Type</b>	Request
<b>Reply</b>	<p>&lt;vendor&gt;&lt;t&gt;&lt;article&gt;&lt;t&gt;&lt;name&gt;&lt;t&gt;&lt;location&gt;&lt;t&gt;&lt;ip&gt;&lt;subnet&gt;&lt;t&gt;&lt;gateway&gt;&lt;t&gt;&lt;MAC&gt;&lt;t&gt;&lt;DHCP&gt;&lt;t&gt;&lt;port&gt;</p> <p>&lt;vendor&gt; IFM ELECTRONIC  &lt;article&gt; Article designation and status, e.g. O2D220AC  &lt;name&gt; Enter the sensor name as in the operating program  &lt;location&gt; Enter the sensor location as in the operating program  &lt;ip&gt; IP address of the device  &lt;subnet&gt; Subnet mask of the device  &lt;gateway&gt; Gateway address of the device  &lt;MAC&gt; MAC address of the device  &lt;DHCP&gt; 0 if DHCP is disabled, 1 if DHCP is enabled  &lt;t&gt; Tabulator character  &lt;port&gt; XML-RPC port number</p>
<b>Note</b>	none

## 12.19 Request the last "bad" image from the device

<b>Command</b>	F?	
<b>Type</b>	Request	
<b>Reply</b>	<length><image data>	Normal case
	!	<ul style="list-style-type: none"> <li>• No application at present.</li> <li>• No evaluation carried out or no error occurred.</li> <li>• Sensor is working.</li> </ul>
<b>Note</b>	<p>&lt;length&gt;: Character string with exactly 9 digits, interpreted as decimal number it indicates the length of the following image data in byte.</p> <p>Image data format according to setting in the operating program.</p>	

## 12.20 Result message

An evaluation result is transmitted in the following format:

<start><result><sc><match><sc><instances>[<sc><model info>]  
[<sc><image info>]<stop>

<start>	start string according to setting in the operating program.
<sc>	separator according to setting in the operating program.
<stop>	stop string according to setting in the operating program.
<result>	total result, either 'PASS' or 'FAIL' string.
<match>	overall match quality, in the format <digit><digit><digit>. <digit>, for example '089.5' for 89.5% match.
<instances>	character string with 3 digits (decimal number) for the number of objects found (instances).
[<model info>]	<p>optional detailed information, only if object detail output has been enabled in the operating program.</p> <p>Format</p> <p>&lt;model_index&gt;&lt;sc&gt;&lt;x&gt;&lt;sc&gt;&lt;y&gt;&lt;sc&gt;&lt;red&gt;&lt;sc&gt;&lt;match_quality&gt;</p> <p>&lt;model_index&gt; two-digit model number.</p> <p>&lt;x&gt; character string with 4 digits, decimal number for X position of the object (in pixels); zero point left.</p> <p>&lt;y&gt; character string with 4 digits, decimal number for Y position of the object (in pixels); zero point top.</p> <p>&lt;rot&gt; character string with six characters for the orientation of the object e.g. +179.0 or -001.3.</p> <p>&lt;match_quality&gt; match quality, in the format &lt;digit&gt;&lt;digit&gt;&lt;digit&gt;. &lt;digit&gt;, for example '089.5' for 89.5% match.</p>
[<image info>]	<p>optional image information only if image output in the operating program has been enabled.</p> <p>Format:</p> <p>&lt;format&gt;&lt;sc&gt;&lt;length&gt;&lt;sc&gt;&lt;image data&gt;</p> <p>&lt;format&gt; 'RAW', 'JPG' or 'BMP' according to the setting of the image format in the operating program.</p> <p>&lt;length&gt; 9-digit decimal number for the quantity of image data in bytes.</p> <p>&lt;image data&gt; image data in the given format.</p>

## 12.21 Error codes from the device

<b>Definition</b>	<b>SENSOR_NO_ERRORS</b>
Numeric value	0
Description	No errors
Solution / Workaround	–

<b>Definition</b>	<b>SENSOR_NO_ACTIVE_CONFIG</b>
Numeric value	0100
Description	No application is currently loaded in the sensor.
Solution / Workaround	Some commands require a running application to be loaded. If this is not the case, an error occurs.

<b>Definition</b>	<b>SENSOR_INVALID_PARM</b>
Numeric value	0105
Description	Invalid input parameter
Solution / Workaround	Read the command documentation to send the required information to the sensor.

<b>Definition</b>	<b>SENSOR_INVALID_STATE</b>
Numeric value	0108
Description	The sensor is in an operation mode which does not permit the execution of commands.
Solution / Workaround	Check the command documentation to see when the command can be executed.

<b>Definition</b>	<b>SENSOR_ERR_NO_MEM</b>
Numeric value	0110
Description	Fatal internal error.
Solution / Workaround	Reboot the sensor.

<b>Definition</b>	<b>SENSOR_CONFIG_NOT_FOUND</b>
Numeric value	0902
Description	Application to be activated not found.
Solution / Workaround	Check whether the application number is correct. Check also if the application can be edited using the PC Software.

<b>Definition</b>	<b>SENSOR_INVALID_TRIGGER_MODE</b>
Numeric value	1000
Description	It is not possible to trigger the sensor because trigger function via TCP/IP is not active.
Solution / Workaround	Review the sensor configuration to change the sensor trigger mode.

<b>Definition</b>	<b>SENSOR_OBJECT_IMAGE_INVALID</b>
Numeric value	1300
Description	Internal fault during the image transmission from / to the sensor.
Solution / Workaround	Check which is the required image format and if all parameters for the results via TCP/IP are correct. In case of a problem during the transmission of information, check whether the information to be sent is correct.

<b>Definition</b>	<b>SENSOR_RESULT_ID_NOT_AVAILABLE</b>
Numeric value	1600
Description	The user tries to obtain a result although no results are available in the sensor.
Solution / Workaround	–

<b>Definition</b>	<b>SENSOR_CURRENTLY_DECODING</b>
Numeric value	1601
Description	The command cannot be executed because the sensor is currently decoding.
Solution / Workaround	Try to execute the command again.

<b>Definition</b>	<b>SENSOR_IMAGE_FORMAT_MISSMATCH</b>
Numeric value	1602
Description	An image is uploaded to the sensor for evaluation. The format detected does not match that of the currently activated application.
Solution / Workaround	Edit the running application to check which is the required image format.

<b>Definition</b>	<b>SENSOR_CONFIG_SWITCHING_ACTIVE</b>
Numeric value	1603
Description	It is not possible to upload an application to the sensor if the external selection of the application is activated.
Solution / Workaround	Use the PC Software to deactivate the external selection of the application.

<b>Definition</b>	<b>SENSOR_TRIGGER_NOT_AVAILABLE</b>
Numeric value	1604
Description	The user sends a trigger to the device via TCP/IP. Due to an internal fault the sensor cannot process the trigger.
Solution / Workaround	This error code shows a sensor failure. Normally the sensor tries to remedy the failure itself. If this error occurs again, reboot the sensor.

## 13 Maintenance, repair and disposal

- ▶ Keep the lens window free from soiling. Soiling may considerably affect the reading result!
- ▶ To clean the lens window, do not use any detergents or solvents which might damage the front glass.
- ▶ Do not open the housing, as the device does not contain any components which must be maintained by the user. The device must only be repaired by the manufacturer.
- ▶ Dispose of the device in accordance with the national environmental regulations.

## 14 Approvals / standards

The CE Declaration of Conformity is available at:

[www.ifm.com](http://www.ifm.com) → Data sheet direct → e.g. O2D220 → Approvals

## 15 Note regarding the software

This unit contains (maybe modified) Open Source software, which is subject to special licensing terms.

For copyright information and licensing terms please refer to:  
[www.ifm.com/int/GNU](http://www.ifm.com/int/GNU)

For software subject to the GNU General Public License or the GNU Lesser General Public License the source code can be requested against payment of the copying and shipping costs.

 The software E2D200 version 3.0 is required as of firmware version 1030.

The software is available at:

[www.ifm.com](http://www.ifm.com) → Data sheet direct → e.g. O2D220 → Download/Software.

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